

WHAT IS CLAIMED IS:

- Swal*
1. An alkali-free glass consisting essentially of, in mass percent, 58-70% SiO₂, 10-19% Al₂O₃, 6.5-15% B₂O₃, 0-2% MgO, 3-12% CaO, 0.1-5% BaO, 0-4% SrO, 0.1-6% BaO+SrO, 0-5% ZnO, 5-15% MgO+CaO+BaO+SrO+ZnO, 0-5% ZrO₂, 0-5% TiO₂, and 0-5% P₂O₅, containing substantially no alkali metal oxide, and having a density of 2.45g/cm³ or less, an average coefficient of thermal expansion of $25 \times 10^{-7}/^{\circ}\text{C}$ - $36 \times 10^{-7}/^{\circ}\text{C}$ within a temperature range between 30 and 380°C, and a strain point not lower than 640°C.
 2. An alkali-free glass according to claim 1, wherein the ratio (BaO+SrO)/BaO falls within a range of 1.1-10 in mass ratio.
 3. An alkali-free glass according to claim 1, wherein the alkali-free glass has a liquidus temperature not higher than 1150°C and a viscosity not lower than $10^{5.4} \text{ dPa} \cdot \text{s}$ at the liquidus temperature.
 4. An alkali-free glass according to claim 1, wherein the erosion of the alkali-free glass is not greater than 10 μm after treatment by a 10% HCl aqueous solution under the condition of 80°C and 24 hours and neither haze nor roughness of the alkali-free glass is confirmed by visual observation after treatment by a 10% HCl aqueous solution under the condition of 80°C and 3 hours.
 5. An alkali-free glass according to claim 1, wherein the erosion of the alkali-free glass is not greater than 0.8 μm after treatment by a 130 BHF solution under the condition of 20°C and 30 minutes and neither haze nor roughness of the alkali-free glass is confirmed by visual observation after treatment by a 63 BHF solution under the condition of 20°C and 30 minutes.
 6. An alkali-free glass according to claim 1, wherein the alkali-free glass has a specific modulus not smaller than 27.5 GPa/(g \cdot cm⁻³).

7. An alkali-free glass according to claim 1, wherein the alkali-free glass does not contain As_2O_3 but contains 0.5-3.0 wt% $\text{Sb}_2\text{O}_3 + \text{Sb}_2\text{O}_5 + \text{SnO}_2 + \text{Cl}$.

8. An alkali-free glass according to claim 1, wherein the alkali-free glass is formed into a plate-like shape by the down-draw process.

9. An alkali-free glass according to claim 1, wherein the alkali-free glass consists essentially of, in mass percent, 60-68% SiO_2 , 12-18% Al_2O_3 , 7-12% B_2O_3 , 0-1% MgO , 4-10% CaO , 0.3-2% BaO , 0.1-2.7% SrO , 0.4% or more and less than 3% $\text{BaO} + \text{SrO}$, 0-0.9% ZnO , 5-12% $\text{MgO} + \text{CaO} + \text{BaO} + \text{SrO} + \text{ZnO}$, 0-1% ZrO_2 , 0-1% TiO_2 , and 0-1% P_2O_5 .

10. A glass plate formed by an alkali-free glass consisting essentially of, in mass percent, 58-70% SiO_2 , 10-19% Al_2O_3 , 6.5-15% B_2O_3 , 0-2% MgO , 3-12% CaO , 0.1-5% BaO , 0-4% SrO , 0.1-6% $\text{BaO} + \text{SrO}$, 0-5% ZnO , 5-15% $\text{MgO} + \text{CaO} + \text{BaO} + \text{SrO} + \text{ZnO}$, 0-5% ZrO_2 , 0-5% TiO_2 , and 0-5% P_2O_5 , containing substantially no alkali metal oxide, and having a density of 2.45g/cm^3 or less, an average coefficient of thermal expansion of $25 \times 10^{-7}/^\circ\text{C}$ - $36 \times 10^{-7}/^\circ\text{C}$ within a temperature range between 30 and 380°C , and a strain point not lower than 640°C .

11. A glass plate according to claim 10, wherein the glass plate is used for a flat display.

12. A glass plate according to claim 10, wherein the glass plate has a thickness of 0.6mm or less.

13. A glass plate according to claim 10, wherein the alkali-free glass consists essentially of, in mass percent, 60-68% SiO_2 , 12-18% Al_2O_3 , 7-12% B_2O_3 , 0-1% MgO , 4-10% CaO , 0.3-2% BaO , 0.1-2.7% SrO , 0.4% or more and less than 3% $\text{BaO} + \text{SrO}$, 0-0.9% ZnO , 5-12% $\text{MgO} + \text{CaO} + \text{BaO} + \text{SrO} + \text{ZnO}$, 0-1% ZrO_2 , 0-1% TiO_2 , and 0-1% P_2O_5 .

14. A liquid crystal display comprising a glass plate formed by an alkali-free glass consisting essentially of, in mass percent, 58-70% SiO_2 , 10-19% Al_2O_3 , 6.5-15% B_2O_3 , 0-2% MgO , 3-12% CaO , 0.1-5% BaO , 0-4% SrO , 0.1-6% $\text{BaO}+\text{SrO}$, 0-5% ZnO , 5-15% $\text{MgO}+\text{CaO}+\text{BaO}+\text{SrO}+\text{ZnO}$, 0-5% ZrO_2 , 0-5% TiO_2 , and 0-5% P_2O_5 , containing substantially no alkali metal oxide, and having a density of $2.45\text{g}/\text{cm}^3$ or less, an average coefficient of thermal expansion of $25 \times 10^{-7}/^\circ\text{C}$ - $36 \times 10^{-7}/^\circ\text{C}$ within a temperature range between 30 and 380°C , and a strain point not lower than 640°C .

15. A liquid crystal display according to claim 14, wherein the alkali-free glass consists essentially of, in mass percent, 60-68% SiO_2 , 12-18% Al_2O_3 , 7-12% B_2O_3 , 0-1% MgO , 4-10% CaO , 0.3-2% BaO , 0.1-2.7% SrO , 0.4% or more and less than 3% $\text{BaO}+\text{SrO}$, 0-0.9% ZnO , 5-12% $\text{MgO}+\text{CaO}+\text{BaO}+\text{SrO}+\text{ZnO}$, 0-1% ZrO_2 , 0-1% TiO_2 , and 0-1% P_2O_5 .

16. A polycrystal silicon TFT liquid crystal display comprising a glass plate claimed in claim 10.